



The Proximal Tubal Occlusion in Women with Bilateral Hydrosalpinx Undergoing in Vitro Fertilization

In Vitro Fertilizasyon Uygulanacak Bilateral Hidrosalpenksli Kadınlarda Proksimal Tubal Oklüzyon

The Proximal Tubal Occlusion for Hydrosalpinx

Pinar Ozcan Cenksoy¹, Cem Fırcıoğlu¹, Ozge Kızılkale¹, Mehmet Suhha Bostancı², Murat Bakacak³, Cigdem Kaspar⁴

¹Department of Gynecology and Obstetrics, Faculty of Medicine, Yeditepe University, Istanbul,

²Department of Gynecology and Obstetrics, Faculty of Medicine, Sakarya University, Sakarya,

³Department of Gynecology and Obstetrics, Kahramanmaraş Sutcu Imam University Faculty of Medicine, Kahramanmaraş,

⁴Department of Medical Informatics, Yeditepe University, Istanbul, Turkey

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Özet

Amaç: Hidrosalpinx endometriuma olumsuz etkileri sebebiyle IVF hastalarında implantasyon ve gebelik oranlarını olumsuz yönde etkiler. Retrospektif çalışmamız bilateral hidrosalpinx olan hastalarda IVF öncesinde yapılan proksimal tubal oklüzyonun yararlı olduğu düşünülerek dizayn edildi. Bu çalışmada IVF uygulanacak bilateral hidrosalpinx olan kadınlarda IVF öncesi etkili bir cerrahi girişim olarak tubal oklüzyon etkisini değerlendirmek ve kendi verilerimizi sunmak amaçlanmıştır. **Gereç ve Yöntem:** Bu retrospektif çalışmaya 2007 ve 2013 yılları arasında IVF ünitesinde rutin infertilite araştırmaları sırasında bilateral hidrosalpinx tanısı 61 kadın dahil edildi. Tüm bilateral tubal oklüzyon işlemleri istmik segmentte bipolar diatermi ile her iki tarafta ayrı olarak laparoskopik olarak yapıldı ve hidrosalpinx drenajı yapılmadı. Primer başarı sonucu klinik gebelik oranı olarak kabul edildi. **Bulgular:** Klinik gebelik oranı IVF öncesi proksimal tubal oklüzyonu yapılan hastalarda % 59 olarak bulundu. Elde edilen gebeliklerin çoğu proksimal tubal oklüzyon sonrası postoperatif birinci veya ikinci siklusta oluştu. **Tartışma:** Laparoskopik tubal oklüzyon, IVF tedavisi öncesinde, özellikle bilateral tubal hidrosalpinx olan genç kadınlarda, gebelik olasılığını artıracak uygun bir cerrahi yaklaşım olarak kabul edilebilir.

Anahtar Kelimeler

Hidrosalpenks; Proksimal Tubal Tikanıklık; Laparoskopi; In Vitro Fertilizasyon; Gebelik Oranları

Abstract

Aim: The hydrosalpinx impairs in vitro fertilization (IVF) outcomes by decreasing the implantation and pregnancy rates because of the detrimental effects on endometrium. Our retrospective study based on analysis of medical records found that proximal tubal occlusion may have benefits in patients with bilateral hydrosalpinx before IVF treatment. To evaluate the impact of proximal tubal occlusion in women with bilateral hydrosalpinx undergoing IVF as an effective surgical intervention for the management of these women prior to IVF and to present our outcomes. **Material and Method:** Sixty-one women diagnosed with bilateral hydrosalpinx during routine infertility investigations in our IVF unit between 2007 and 2013 were included in this retrospective study. All bilateral proximal tubal occlusions were performed laparoscopically by bipolar diathermy on the isthmic segment at two separate sites, and drainage of the hydrosalpinx was not performed. The primary outcome was clinical pregnancy rate. **Results:** The clinical pregnancy rate was 59% in patients who underwent proximal tubal occlusion before IVF. Most of them eventually did conceive in the postoperative first or second cycle after proximal tubal occlusion. **Discussion:** The laparoscopic proximal tubal occlusion might increase the probability of pregnancy, especially in younger women, and it could be viewed as a reasonable surgical approach due to the above-mentioned advantages.

Keywords

Hydrosalpinx; Proximal Tubal Occlusion; Laparoscopy; In Vitro Fertilization; Pregnancy Rates

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Corresponding Author: Murat Bakacak, Kahramanmaraş Sutcu Imam Üniversitesi, Tıp Fakültesi, Avsar Kampusu, Merkez, Kahramanmaraş, Turkey.

T.: +90 3442803739 F.: +90 3442803738 E-Mail: muratbakacak46@gmail.com

Introduction

The tubal factor, accounting for 25%–35% of female infertility, is one of the most frequent causes of subfertility [1]. Hence, the assessment of the cause of infertility should include hysterosalpingography to check tubal patency [1]. As well as checking tubal patency, it should be kept in mind that the presence of hydrosalpinx impairs in vitro fertilization (IVF) outcomes by decreasing the implantation and pregnancy rates because of the detrimental effect of the accumulation of hydrosalpinx fluid through the uterine cavity on the transferred embryos and endometrial receptivity, mechanical washing of the blastocyst, and deterioration of embryo development as a consequence of the hydrosalpingeal fluid's deficiencies in nutrients and energy stores [3-7]. Reproductive surgical interventions in patients with hydrosalpinx who underwent IVF cycles, such as salpingectomy, tubal occlusion, and aspiration, have also been reported to dramatically enhance IVF outcome [8].

Reproductive surgery's role in treating infertile patients with tubal diseases, periadnexal adhesions, or endometriosis has recently been of great importance through dramatic improvements in pregnancy rates of IVF treatment. Reproductive surgery could be classified as a primary treatment for infertility, in vitro fertilization outcome-enhancing surgery, and surgery for fertility preservation. With the improvement in assisted reproductive technologies (ARTs), the value of reproductive surgery by minimally invasive techniques and the shift from primary treatment for infertility to in vitro fertilization outcome-enhancing surgery have been questioned. Suggested surgical interventions for hydrosalpinx before IVF treatment include salpingectomy, salpingostomy, aspiration of hydrosalpinx fluid, and proximal tubal occlusion [9].

Reproductive surgery plays an important role in the management of infertility in the era of ART. The responsibility of the reproductive specialist is to understand the role of reproductive surgery and utilize in vitro fertilization outcome-enhancing surgery appropriately and effectively in properly selected reproductive cases in women with defined hydrosalpinx who plan to undergo IVF treatment. For a considered decision, it is important to have the best available evidence provided by trials that evaluate the beneficial effects of these interventions. The aim of the present study was to evaluate the impact of proximal tubal occlusion in women with bilateral hydrosalpinx undergoing IVF as an effective surgical intervention for the management of these women prior to IVF and to present our outcomes.

Material and Method

Participants:

This retrospective study was based on analysis of the medical records of all patients who underwent laparoscopy to confirm hydrosalpinx and all hydrosalpinges were managed by the same operator (C.F.) due to the presence of bilateral hydrosalpinx defined by hysterosalpingography during routine infertility investigations in our IVF unit between 2007 and 2013. It was conducted at the Department of Obstetrics and Gynecology, Yeditepe University Hospital, Istanbul, Turkey. The study protocol was approved by the Ethical Committee of the Medical Faculty of Yeditepe University. Sixty-one women were included in the study. The subjects included were primary infertile pa-

tients programmed for IVF, with absence of any other obvious uterine disorder, with BMI \leq 25 kg/m², between 18 and 41 years old, with FSH levels on cycle day 3 of \leq 12 mIU/mL, and with no contraindications for laparoscopic surgery. None of the patients had a history of previous ectopic pregnancy, of previous use of an intrauterine contraceptive device, of previous abdominal surgery including appendectomy, of smoking, of medical illness, and of medication use or of additional male-factor infertility.

In our IVF unit, evaluation of the patients, laparoscopic procedures, and embryo transfer are performed by one operator (C.F.), and we routinely recommend a laparoscopic examination to confirm and manage hydrosalpinx in patients with defined hydrosalpinx by hysterosalpingography prior to IVF treatment. Appropriate counseling was given to these patients regarding the risks and benefits of surgery.

Laparoscopic procedure:

All bilateral proximal tubal occlusions were performed laparoscopically by bipolar diathermy on the isthmic segment at two separate sites, and drainage of the hydrosalpinx was not performed. Patients were discharged the day after surgery.

Assisted reproduction procedures:

IVF was undertaken within 2 months of surgery. Controlled ovarian stimulation protocols were used: luteal leuprolide acetate downregulation (long) or antagonist protocol and stimulation with recombinant follicle stimulating hormone (recFSH). Initial doses ranging from 150 to 450 IU daily were based upon age, early-follicular phase serum FSH and E2 levels, and resting antral follicle count, detected by follicular phase ultrasonography. Doses were adjusted on the basis of serial sonographic measurements of follicular development and serum E2. hCG was administered when at least two follicles reached a mean diameter of $>$ 17 mm. Transvaginal ultrasound-guided oocyte retrieval was performed 36 hours after hCG administration. Fertilization of the oocytes was performed using the standard ICSI techniques. Embryo transfers were performed on day 3 or 5. Transfers were performed with the Wallace catheter (Smiths Medical International Ltd., Hythe, Kent, UK) using after load transfer under abdominal ultrasonographic guidance. Luteal phase support was provided using Crinone vaginal gel (Crinone 8%, 90 mg; Merck Serono, Central Pharma Ltd, Bedfordshire, UK) daily. Serum quantitative b-hCG levels were obtained 12 days after embryo transfer. A clinical pregnancy was defined as the presence of a fetal sac visualized by transvaginal ultrasound examination. Patients who did not conceive had undergone four consecutive cycles. The patients who did not conceive were defined as Group I and patients who conceived were defined as Group II.

Statistical Analysis:

Analyses were done using the Statistical Package for the Social Sciences, version 20 (SPSS, Chicago, IL, USA). Data were reported as mean \pm SD or number and percentage. The two-independent samples t-test was used to compare the group means of the continuous variables; $P \leq .05$ was considered significant.

Results

There were no postoperative complications in the 61 patients. Patient characteristics including age, attempt number, duration of infertility, total dosage of gonadotropins, maximum estradiol levels, and total number of oocytes retrieved are summarized in Table 1. The clinical pregnancy rate was 59%. Most of them

Table 1. Patients characteristics

Variables	n=61
Age (Year)	32,54±4,093
Duration of infertility (year)	5,51±3,48
Total dosage of gonadotropins (IU)	3223±1117
Maximum estradiol levels (pg/mL)	2087±1017
Total number of oocytes retrieved (No.)	8,74±5,08
Duration of stimulation (d)	9,05±1,13
Attempts (No.)	1,84±0,89

eventually did conceive in the postoperative first or second cycle after proximal tubal occlusion. The cumulative conception curve is shown in Figure 1. In women who did not con-

Figure 1. The cumulative conception curve.



Number of attempt of IVF procedure (No.)

ceive (Group I), age, attempt number, duration of infertility, and total dosage of gonadotropins were significantly higher, while maximum estradiol levels and total number of oocytes retrieved were significantly lower compared to women who conceived (Group II)(Table 2). The mean age of patients at surgery was

Table 2. IVF treatment parameters and outcomes in group I and II

Variables	Group I (n=25)	Group II (n=36)	P
Age (Year)	34,12±4,065	31,44±3,79	0,011*
Duration of infertility (year)	6,08±4,25	5,11±2,82	0,289
Total dosage of gonadotropins (IU)	3670±1233	2913±924	0,008*
Maximum estradiol levels (pg/mL)	1480±791	2521±943	0,000*
Total number of oocytes retrieved (No.)	5,48±3,31	11±4,8	0,000*
Duration of stimulation (d)	9,36±1,21	8,83±1,02	0,074
Attempts (No.)	2,12±1,013	1,64±0,72	0,038*

All values are expressed as mean ± SD. *P < .05, significant difference between group 1 and group 2.

34.12±4.065 vs. 31.44±3.79 years and the average duration of infertility before surgery was 6.08±4.25 vs. 5.11±2.82 years in groups I and II, respectively. There was no difference in the du-

ration of infertility and stimulation among those patients who conceived and those who did not.

Discussion

Many reports have confirmed that the presence of bilateral hydrosalpinx is associated with pregnancy rates decreased by half and with significantly increased miscarriage rates; and the management of hydrosalpinx by laparoscopic salpingectomy or proximal tubal occlusion prior to IVF improves subsequent pregnancy and live birth rates [10]. Therefore, nowadays, reproductive surgery plays a crucial part in enhancing IVF outcome; and the management of women with defined hydrosalpinx who plan to undergo IVF treatment is of great importance because of the detrimental effect of hydrosalpinx on the outcome of ARTs. In the Cochrane Database Systematic Review, 2010, a meta-analysis including five randomized controlled trials with 646 women concluded that surgical treatment should be recommended to all women with hydrosalpinx before an IVF attempt; and laparoscopic tubal occlusion is an alternative to laparoscopic salpingectomy in improving IVF pregnancy rates in women with hydrosalpinx [9]. The favorable effect of laparoscopic salpingectomy on pregnancy and implantation rates in patients with hydrosalpinx before IVF cycle was already demonstrated by previous studies [11, 12]. A prospective randomized trial by Kontoravdis et al. also supported the beneficial effect of prophylactic salpingectomy before IVF treatment [13]. Although the benefits of salpingectomy include the removal of chronically infected tissue that tends to lead to abscess formation or torsion and increasing the accessibility of the ovary during oocyte retrieval in IVF and reducing the risk of infection, the procedure has some disadvantages, such as being more invasive, more difficult or risky in patients with extensive pelvic adhesions or previous abdominal surgery, and associated with an increased risk of interstitial pregnancy. Of greater importance is that salpingectomy may cause a theoretical decrease in ovarian blood perfusion, as demonstrated in a rat model [14]. Moreover, a previous study demonstrated that the procedure has significant adverse effects on ovarian hyperstimulation parameters [15]. In view of the above-mentioned reasons, in-vitro fertilization outcome-enhancing surgery should be seriously considered before applying IVF treatment involving significant cost and/or potential risks. In addition, to minimize injury to the ovary, especially in infertile patients, surgery should be performed carefully and newer laparoscopic approaches that might be less invasive, easier, and as effective and safe as salpingectomy adopted. The favorable features of laparoscopic proximal tubal occlusion, such as its being easier to perform, its low morbidity rate, its speed, its minimal invasiveness, and its short hospitalization period, may make it an eligible option with a good probability of achieving an intrauterine pregnancy.

Which surgical interventions to perform depends on the advantages or disadvantages of the techniques: salpingectomy versus proximal tubal occlusion. Many studies have confirmed the beneficial effects of salpingectomy and recommended salpingectomy for all women with hydrosalpinx undergoing IVF, and the majority of clinicians have frequently carried out laparoscopic salpingectomy in clinical practice prior to IVF [16, 17]. Salpingectomy commonly remains the most frequently under-

taken procedure. Despite this fact, when compared with salpingectomy, proximal tubal occlusion could be considered an effective alternative in-vitro fertilization outcome-enhancing surgery for women with hydrosalpinx prior to IVF because of some advantages, including being less invasive, safer, with a shorter learning curve and easier to perform in selected patients, and shorter hospitalization [8, 18-20].

In the present study, the clinical pregnancy rate in women who underwent laparoscopic proximal tubal occlusion because of bilateral hydrosalpinx was 59%. Most of them eventually did conceive in the postoperative first or second cycle after the procedure. The results of the present study revealed that proximal tubal occlusion in patients with bilateral hydrosalpinx before IVF treatment may have benefits. However, some limitations of the present study need to be pointed out: (1) the relatively small sample size, (2) being a retrospective study, not being a randomized controlled trial. On the other hand, we selected cases carefully and only included patients with primary infertility and bilateral hydrosalpinx. The main purpose of the current study is to present our outcomes because we think that the results might contribute to the literature. Furthermore, all laparoscopic proximal tubal occlusions were performed by the use of a single surgical technique and by one surgeon. In addition, there are several factors that are known to independently influence pregnancy rates during IVF treatment. Prognostic variables affecting pregnancy outcome such as age and the duration of infertility were also examined in the present study. We noted that women who conceived were younger, they had shorter infertility duration, they had less need for the total dosage of gonadotropins, they had higher maximum estradiol levels, and greater total oocyte numbers were retrieved from them. In the light of our results, the current study has shown that proximal tubal occlusion substantially improved pregnancy rates when we controlled for other patient characteristics noted to affect pregnancy rates.

In conclusion, the management of hydrosalpinx prior to IVF treatment is one of the most frequent in-vitro fertilization outcome-enhancing treatment modalities. There is a wide variation in practice for hydrosalpinx management options. We think that there is need for standardized guidelines for hydrosalpinx management to improve IVF outcomes and we suggest that the importance of diagnosis of hydrosalpinx and the treatment options according to the available evidence and the patient's suitability should be defined. In line with the results of this study, laparoscopic proximal tubal occlusion might increase the probability of pregnancy, especially in younger women, and it could be viewed as a reasonable surgical approach due to the above-mentioned advantages. We think that the present study will contribute to the drawing up of guidelines for assessment of the value of proximal tubal occlusion as a reasonable surgical intervention to improve IVF outcomes in the management of patients with hydrosalpinx. Further well-designed randomized controlled trials are required to assess the value of proximal tubal occlusion prior to IVF procedures as an alternative.

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Competing interests

The authors declare that they have no competing interests.

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